

Sanitized
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PRELIMINARY REPORT

ATF-5

Test Date: 7 December 1962

Report Date: 12 December 1962

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STAT

cc: All Group Leaders

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STAT

25 YEAR RE-REVIEW

SUMMARY

ATF-5

System 1A flown in vehicle #123 without Q-bay liner on December 7, 1962 to test IMC, V/h and focus. V/h Subsystem either inoperative or incorrectly scaled as film velocity was 20% lower than required. Photos indicate fairly good synchronization between scanner velocity and film velocity. Actual V/h ranges experienced were over range of 36 to 38 mr/sec and altitudes of 14,500 to 35,000 feet. Both scanners incorrectly phased making evaluation of IMC and V/h almost impossible. AF type bar targets were used yielding resolutions from "very poor" to 77 l/mm. No stabilization data recorded because wrong connector used for test signals. Difficulty was experienced with the master oscillator of instrumentation. Recommend rerun of this flight test.

ATF-5 REPORT

1.0 GENERAL

ATF-5 was flown in vehicle #3 (S/N 123) on December 7, 1962 to test IMC, V/h and focus. Complete data reduction is yet to be received from the field. Information available to date is as follows and reflects a variety of sources.

2.0 TEST CONDITIONS

DATE:	7 December 1962
TAKE OFF:	1032 PST
LAND.:	1206 PST
SYSTEM AT STANDBY:	0942 PST
ALT/SPEED:	See paragraph 4.0
WIND:	See paragraph 4.0
VEHICLE:	S/N 123, No Q-bay liner, air environment
WEATHER:	Clear and cloudless

3.0 SYSTEM CONDITION

Aft shuttle locked (voice coil rubbing and shorting out -- repaired after flight)

Active V/h sensor and subsystem (#2 sensor and preamp)

Auto start-up active

Fixed slits (no time available to correct relay pulse problems -- for which solution existed)

Scanners rephased (after flight discovered phasing in error)

Cage status light on Control Panel inoperative but operative in Data Chamber.

AF Type resolution ground targets available.

Clock not wound in Data Chamber.

4.0 TEST RESULTS

Four runs made as follows:

<u>RUN#</u>	<u>T/H</u>	<u>ALT</u>	<u>TAS</u>	<u>MACH</u>	<u>TRACK OVER TARGET</u>	<u>WIND</u>
1	007 ⁰	14,650	330 Kn	.51	100 yards W.	15 kn @ 050 ⁰
2	187 ⁰	25,400	547 Kn	.89	150 yards W.	15 Kn @ 070 ⁰
3	007 ⁰	25,300	541 Kn	.89	200 yards W.	15 Kn @ 070 ⁰
4	187 ⁰	35,100	765 Kn	1.27	50 yards E.	25 Kn @ 010 ⁰

where:

T/H = True heading

ALT = Altitude above ground (pressure altitude corrected for
temperature and elevation of terrain)

TAS = True air speed - assumption made that data reported here
is same as true ground speed.

4.1 FILM TRANSPORT

Timing dots show film speed ranging from 8.0 to 10.9 ips with slow, random variations. This is supported by Capstan and Synchronizer tach voltages. (See further remarks under V/h). No forward LVSYN voltage recorded (IMC motion of shuttle) because signal could not be detected during ground check. No time available to trace cause (which existed between signal C-coil and LVSYN) so IMC resolver signal substituted at C-coil. Forward shuttle did move during flight. Film came up to speed from standby in about 2½ to 3 minutes (versus 70 seconds for ATF-4).

Examination of film shows shutters, timing dots (and suppression for nadir) and Data chamber flash in proper phase relationship.

Scanners not phased properly. Forward scanner leading its correct position by 45° and aft scanner leading its correct position by 55° . This means that aft scanner was leading the forward scanner by 10° instead of $42\frac{1}{2}^{\circ}$. On ATF-4 the forward scanner was phased properly (to about $\pm 3^{\circ}$) and the aft was misphased (leading) 40° --the same condition as LTF-17.

4.2 V/H SUBSYSTEM

New subsystem installed with Sensor #2 and Preamp #2.

Computed V/h for each run is:

RUN	V/H MR/SEC	EQUIVALENT V_f , ips	TIMING DOT INFO
1	38	12.2	Range of
2	36.4	11.7	8 to 10.9
3	36.4	11.6	ips
4	36.7	11.8	

That the film ran slower than required by the V/h rate of the vehicle is also established by the forward overlap seen on the film--it was appreciably less than 50%.

The recorded V/h signal had no detectable amplitude, being almost a straight line. This may be due to instrumentation (master oscillator malfunctioned, thereby preventing the DC amplifier from working) or to an open connection in the V/h subsystem/sensor.

4.3 STABILIZATION

Instrumentation plug VI was used (accelerometers--which were not mounted) instead of plug I as called out by Test Plan. This resulted in complete loss of all Stabilization signals, which are on plug I. From caging light in data chamber, system was caged for 2/3 of

test.

4.4 OPTICAL BENCH TEMPERATURES

Temperature data not reduced as yet although following was reported: ground temperature 72°F, Q-bay temperature (ground ?, at altitude ?) 78°F.

4.5 FILM IMAGE

Fixed slits were used. Film appears to be slightly overexposed. Same slit width as ATF-4 was used (1/255 arc at 11.6 ips). As the film ran slower (ie: at 8 ^{ips} ~~ops~~) exposure would be greater. The aft edge of the aft frame (width direction) was at the edge of the film and wandered slightly (about .050 inch) over a ten foot film length. Resolution on Forward frames was 42 to ⁶⁶~~62~~ 1/mm for targets parallel to flight line (i.e. synchronism of scan speed to film speed was good.) Forward system resolution in other direction was max at 25 1/mm. Additional data is in table I based upon work done at the Area on the day of the flight. Other comments:

- a) Static (or pressure) marks, similar to AFT-4 were evident in approximately the same quarter of the film..
- b) Latitude counter did not move.
- c) Longitude counter did move.
- d) Clock out of focus and not running..
- e) Aft timing dots out of focus.
- f) Forward slit fairly dirty, aft somewhat so.
- g) Some banding exists in the aft frames.

4.6 PILOT DEBRIEFING

Pilot's comments were as follows:

- a) Flight normal and to flight plan.

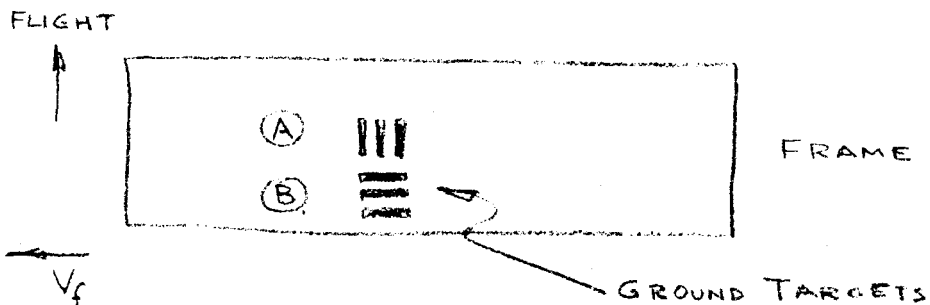
- b) No excessive vibration, roll or pitch rates or skids experienced during runs.
- c) Cage light did not come on.
- d) Reset switch not used.
- e) Standby and operate light performed normally.
- f) First part of run #4 was in acceleration but velocity was stable before reaching target area.
- g) Runs 1, 2, 3 made at stable velocity and altitude.

5.0 CONCLUSIONS

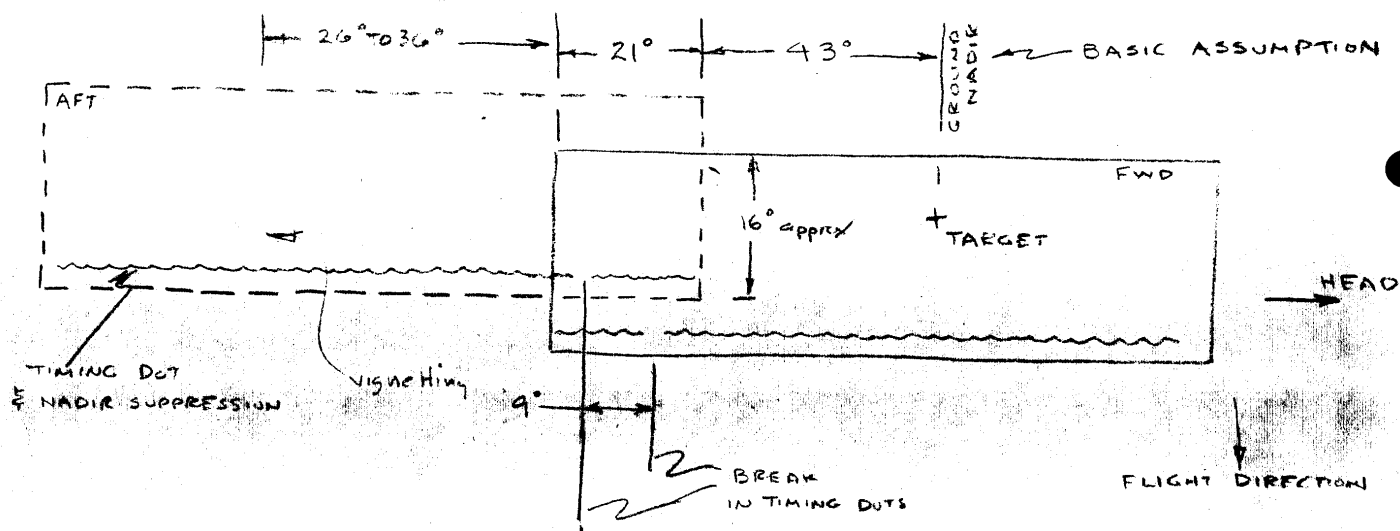
- 5.1 Rephase scanners and check IMC, capping shutter phasing.
- 5.2 Implement correction of slit relay pulse (elements relay).
- 5.3 Check V/h sensor grid frequency, focus, wiring from interface package to system and test signal wiring.
- 5.4 Locate break in LVSYN test signal lead and correct.
- 5.5 Do not short cut ground check-out with Brush recorder.
- 5.6 Replace Natel Master Oscillator (spare available December 14th).
- 5.7 Institute search for cause of static (or pressure) marks.
- 5.8 Recommend fly same test again, after corrections.

TABLE I
RESOLUTION MEASUREMENTS, ATF-5
PRELIMINARY

RUN	BENCH	A PARALLEL TO FLIGHT DIRECTION 1/mm	B PARALLEL TO SCAN DIRECTION 1/mm	NOTES
1	FWD	33 66	18	5. 1/mm highest from target
2	AFT	77	43	
3	FWD	61	Less than 30	9° OFF AXIS
4	FWD	42	<u>Very poor</u>	



ATF-5
SCANNER PHASING
RUN 1



ANGLES IN TERMS OF β AT 3.25" / INCH OF FILM
ANGLES MEASURED $\pm 5^\circ$

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FWD TO FWD OVER-LOOK = 2 INCHES OF FRAME $\approx 3^\circ$ OF α